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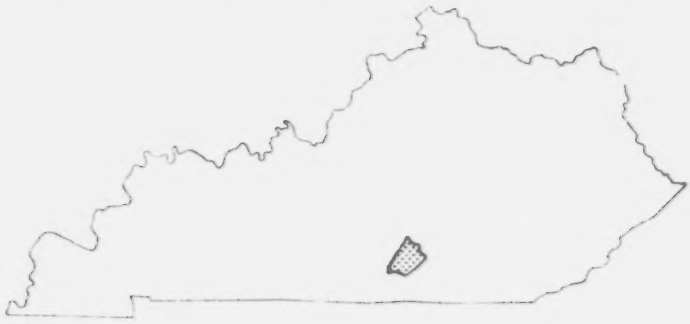
FLOOD INSURANCE STUDY

RUSSELL COUNTY, KENTUCKY

UNINCORPORATED AREAS



SEPTEMBER 28, 1990

Federal Emergency Management Agency

COMMUNITY NUMBER - 210205

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

UNINCORPORATED AREAS,
RUSSELL COUNTY,
KENTUCKY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Unincorporated Areas of Russell County, Kentucky, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by GRW Engineers, Inc. (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-87-C-2455. This study was completed in September 1988.

The hydrologic and hydraulic analyses for Cumberland Lake were performed by the U.S. Army Corps of Engineers (COE), Nashville District.

1.3 Coordination

On October 24, 1986 an initial coordination meeting was held with representatives of FEMA, Russell County, and the study contractor. Coordination with town officials and Federal, State, and regional agencies produced a variety of information pertaining to floodplain regulations, available community maps, flood history, and other hydrologic data. The U.S. Geological Survey (USGS), Kentucky Division of Water, U.S. Soil Conservation Service, and the COE, Louisville and Nashville Districts were

contacted for data concerning flood discharges and elevations. Vertical control data used to establish the network of elevation reference marks was provided by the USGS.

On December 1, 1989, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Russell County, Kentucky. The area of study is shown on the Vicinity Map (Figure 1). The incorporated areas within the county were excluded from this study.

Flooding caused by overflow of the Cumberland River (Lake Cumberland), Big Lily Creek and Little Lily Creek was studied in detail.

Areas having low development potential or minimal flood hazards were previously studied using approximate analyses. The results were shown on the Flood Hazard Boundary Map for Russell County, Kentucky (Reference 1) and are incorporated into this Flood Insurance Study.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through September 1993. The scope and methods of study were proposed to and agreed upon by FEMA and Russell County.

2.2 Community Description

Russell County is in south-central Kentucky. The City of Jamestown is the county seat. The county is bordered on the north by Casey County, on the east by Pulaski County, on the south by Wayne, Clinton and Cumberland Counties, and on the west by Adair County. Russell County is served by U.S. Route 127, State Routes 52, 92, and 619 and Cumberland Parkway. The 1980 population was reported to be 13,708 (Reference 2).

Big Lily Creek, a tributary of the Cumberland River (Cumberland Lake), flows south through the county over a distance of approximately 11.14 miles. Little Lily Creek is a tributary of Big Lily Creek. Little Lily Creek flows south through the county a distance of about 4.36 miles. Both streams discharge into Cumberland Lake near Jamestown, Kentucky.

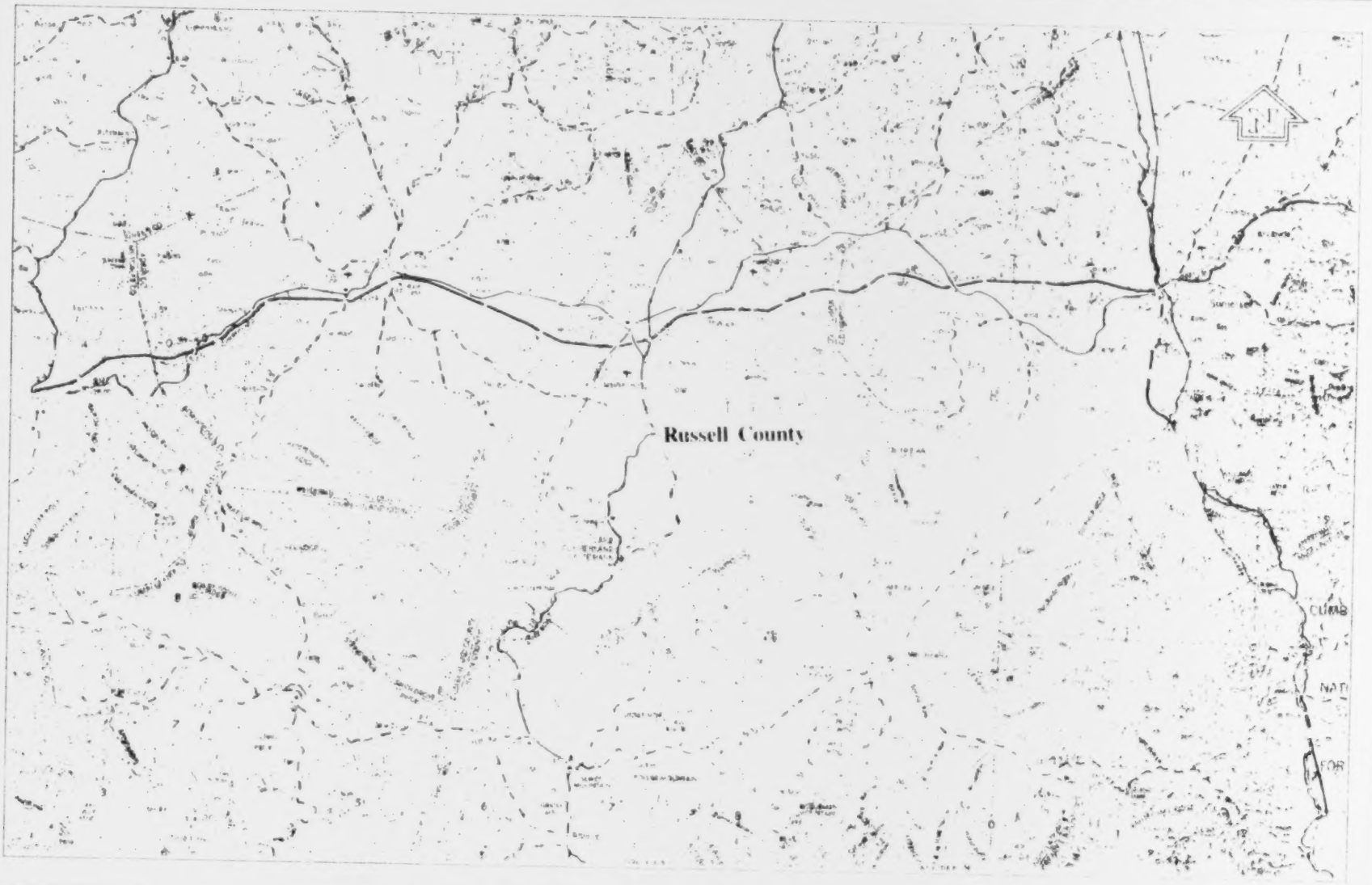

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

RUSSELL COUNTY, KY
(UNINCORPORATED AREAS)

APPROXIMATE SCALE

0 7 14 21 MILES

VICINITY MAP

In Russell County, the summers are hot in the valleys and slightly cooler in the hills, and the winters are moderately cold. Rains are fairly heavy and well distributed throughout the year, with an annual precipitation of approximately 50 inches. Of this, about 50 percent usually falls in April through September.

There is very little development within the floodplain limits of either of these two streams, and that which does exist consists of scattered residential and agricultural development.

2.3 Principal Flood Problems

There are no USGS gaging stations in the study area or within close proximity to provide historical flood frequency analysis for either stream. The Kentucky Department of Transportation provided personal on-site analysis of conditions during and after the September 1984 flood via telephone conversation. During field reconnaissance it was noted by local residents that Big Lily Creek overtopped State Route 619 in September 1984. Little Lily Creek high-water levels nearly reached State Route 619 as well. Further investigation concluded that the box culvert on Big Lily Creek was one-half to three-fourths clogged with tree roots and other debris thus causing the otherwise seemingly adequately sized box culvert to restrict flows and create an overtopping.

Due to the steep slopes, soil types and high velocities of streamflow, soils along the banks of both creeks are susceptible to severe erosion. Both streams can become flood problems at restrictions without receiving substantiating rainfall, as was the case in September 1984.

2.4 Flood Protection Measures

Cumberland Lake on the Cumberland River is formed by Wolf Creek Dam which is operated by the COE for purposes of generating hydroelectric power and flood control. This facility provides no meaningful protection against the 100-year flood.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between

floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40-percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60-percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The discharges for each of the two streams were determined by methods designed for ungaged streams (Reference 3). These methods enabled the determination of the 10-year, 50-year, and 100-year discharges of each stream, and from these three values a 500-year discharge was calculated through a regression analysis of the discharge versus log-of-return-interval relationship (Reference 4).

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
BIG LILY CREEK					
about 0.5 mile downstream of State Route 619	10.23	1,597	2,357	2,695	3,460
just upstream of confluence of Little Lily Creek	6.70	1,199	1,781	2,039	2,620
just downstream of Clear Springs Road	5.12	999	1,490	1,708	2,210
LITTLE LILY CREEK					
at mouth	3.36	751	1,127	1,294	1,660
at Halkay Road	1.67	468	709	816	1,055

The elevations for the 100-year flood on Cumberland Lake as obtained from the COE is shown in Table 2.

TABLE 2 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	PEAK ELEVATION (FEET NGVD) 100-YEAR
CUMBERLAND LAKE within community	749.8

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data for the streams studied were obtained from field survey. Bridges and culverts were surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Water-surface profiles were developed using the HEC-2 step-backwater computer program (Reference 5). In the case of Big Lily Creek, (from the downstream study limit to the base of the waterfall located just upstream of State Route 619), the starting water-surface elevations were calculated using the slope-area method. Starting water-surface elevations upstream of the waterfall were obtained from HEC-2 modeling by starting the computations at critical depth. Little Lily Creek starting water-surface elevations were calculated using the slope-area method beginning at the culvert at State Route 619. The portion downstream to the confluence with Big Lily Creek is of supercritical flow due to the streambed extreme slope.

Elevations on the Cumberland River upstream of Wolf Creek Dam are controlled by the Cumberland Lake pool.

Roughness coefficients (Manning's "n") used in hydraulic computations were chosen by engineering judgment and based on field observations of the streams and floodplain area. Values for the channel of each stream were estimated to be 0.10 due to the streams' mountainous characteristics and steep slopes. Values less than this indicated supercritical flow; however, trial supercritical analysis did not substantiate such flow. Overbank values were estimated to be 0.14 for all streams.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with contour intervals of 10 feet, and 20 feet (Reference 6).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using Flood Hazard Boundary Map for Russell County, Kentucky (Reference 1).

4.2 Floodways

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

Floodways have not been shown or computed for this community. Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base

flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The Flood Insurance Rate Maps printed for Wayne and Clinton Counties, Kentucky and the City of Jamestown, Kentucky (References 7-9) are in agreement with this study.

The Flood Insurance Study in progress for Pulaski County, Kentucky (Reference 10) is in agreement with this study.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for Russell County, Kentucky (Reference 1).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, NE., Suite 736, Atlanta, Georgia 30309.

Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the map repository of flood hazard data located in the community.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Russell County, Unincorporated Areas, July 1977.

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3. U.S. Geological Survey, Water-Resources Investigations 76-62, Technique for Estimating Magnitude and Frequency of Floods in Kentucky.

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6. U.S. Geological Survey, 7.5 Minute Series Topographic Map, Scale 1:24000, Contour Interval 20 Feet: Jamestown, Kentucky, 1978; Contour Interval 10 Feet: Russell Springs, Kentucky, 1973.

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9. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Rate Map, City of Jamestown, Kentucky, June 1976.

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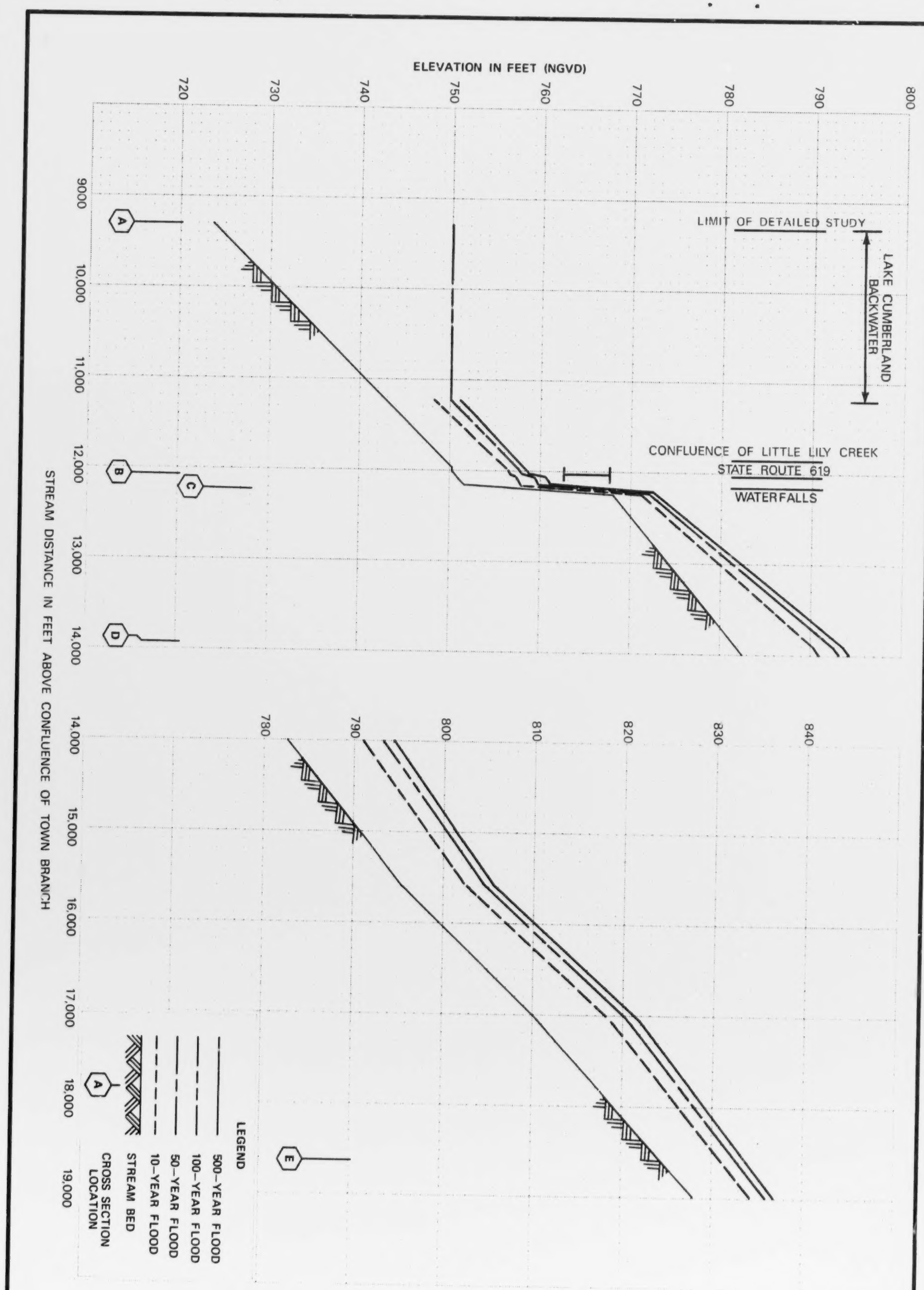
Chow, Ven T., Open-Channel Hydraulics, New York: McGraw-Hill Book Company, Inc., 1959.

U.S. Department of the Interior, U.S. Geological Survey Water-Data Report KY-87-1, Water Resources Data: Kentucky Water Year 1987.

U.S. Department of the Interior, Geological Survey, Roughness Characteristics of Natural Channels, 1967.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0075	767.68	railroad spike in base of tree located at northeast corner of State Route 619 bridge over Big Lily Creek
2	0075	1,018.79	PK nail in road at northeast corner of tee intersection of Halkay Road and Nelson Road
3	0075	912.61	chiseled square located in northwest corner of Halkay Road bridge curb over Little Lily Creek
4	0050	862.74	painted cross in northeast corner of Clear Springs Road bridge over Big Lily Creek
5	0050	992.50	PK nail in road at intersection of Clear Springs Road and Halkay Road
6	0050	1,020.31	PK nail in post located on Clear Springs Road about 0.9 mile north of intersection with Halkay Road
7	0050	1,051.64	PK nail in power pole located on Clear Springs Road about 1.6 miles north of intersection with Halkay Road
8	0050	987.29	standard disk stamped "C239 1951" set in concrete post located on U.S. Route 127 about 800 feet north of intersection with State Route 92, about 500 feet northwest of small cross road, about 240 feet southeast of city limits sign, 100 feet northwest of Knight Grocery, 2 feet southwest of fence corner.



FEDERAL EMERGENCY MANAGEMENT AGENCY

RUSSELL COUNTY, KY
(UNINCORPORATED AREAS)

FLOOD PROFILES

BIG LILY CREEK

01P

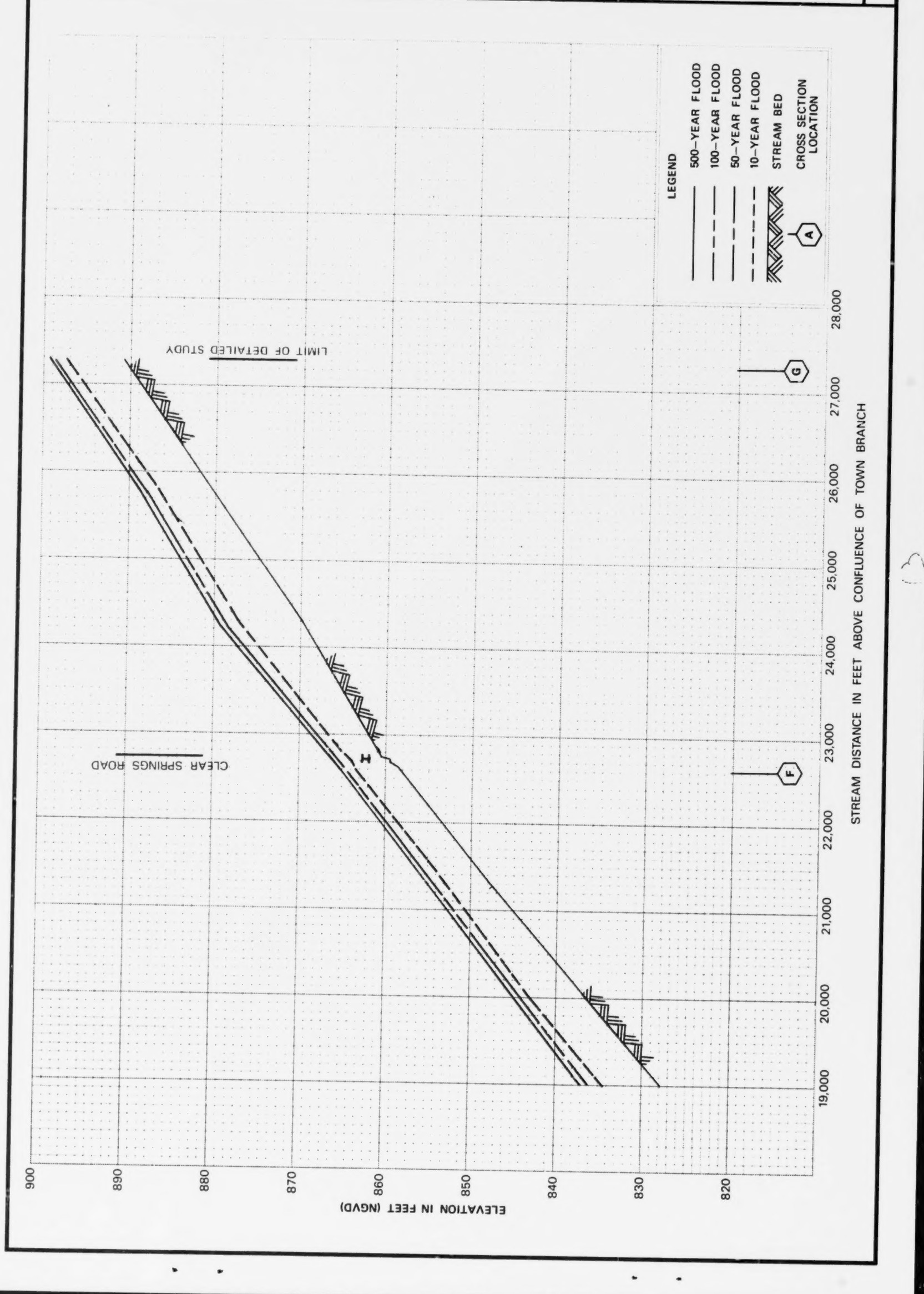
FEDERAL EMERGENCY MANAGEMENT AGENCY

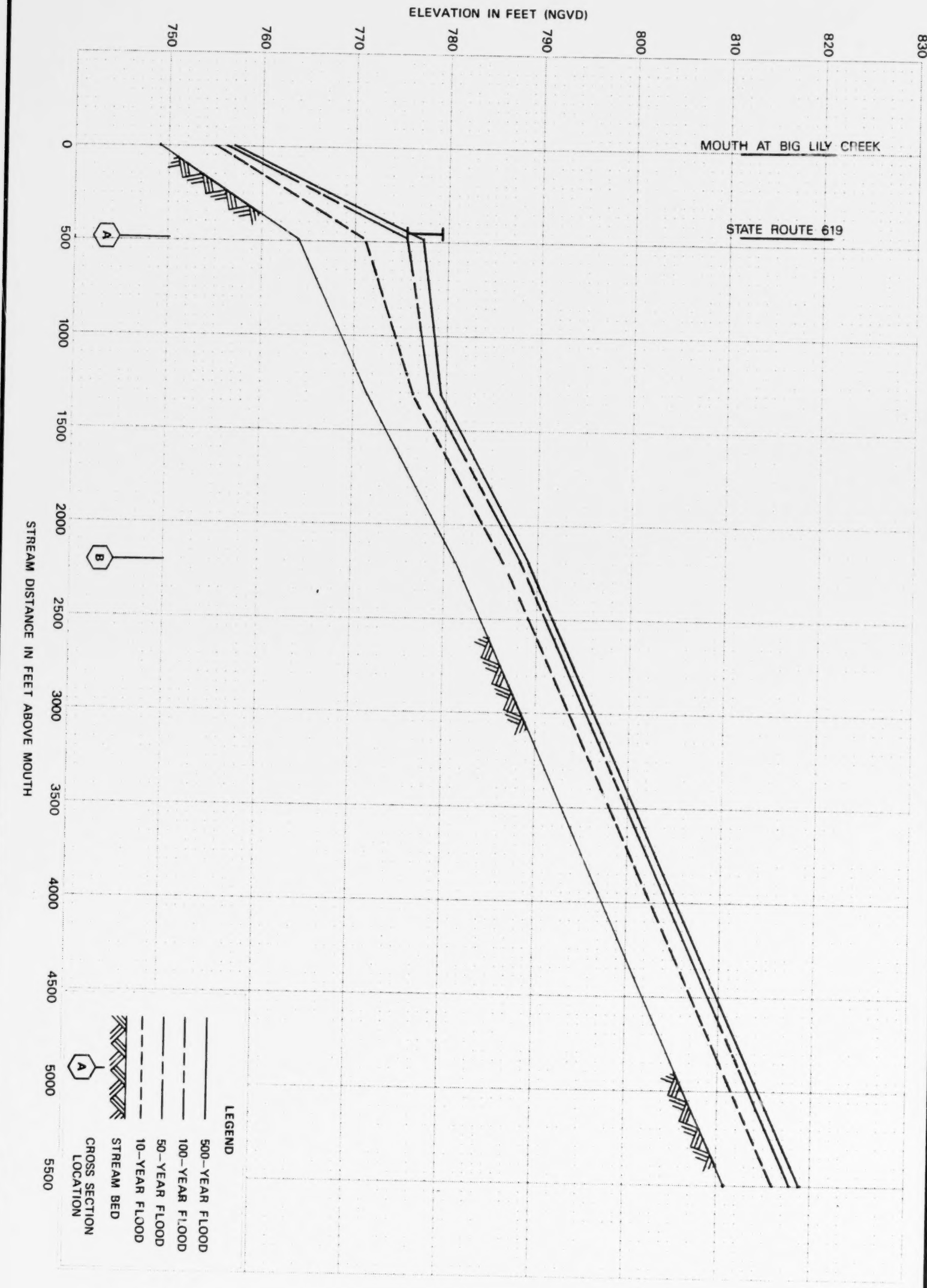
RUSSELL COUNTY, KY
(UNINCORPORATED AREAS)

02P

FLOOD PROFILES

BIG LILY CREEK





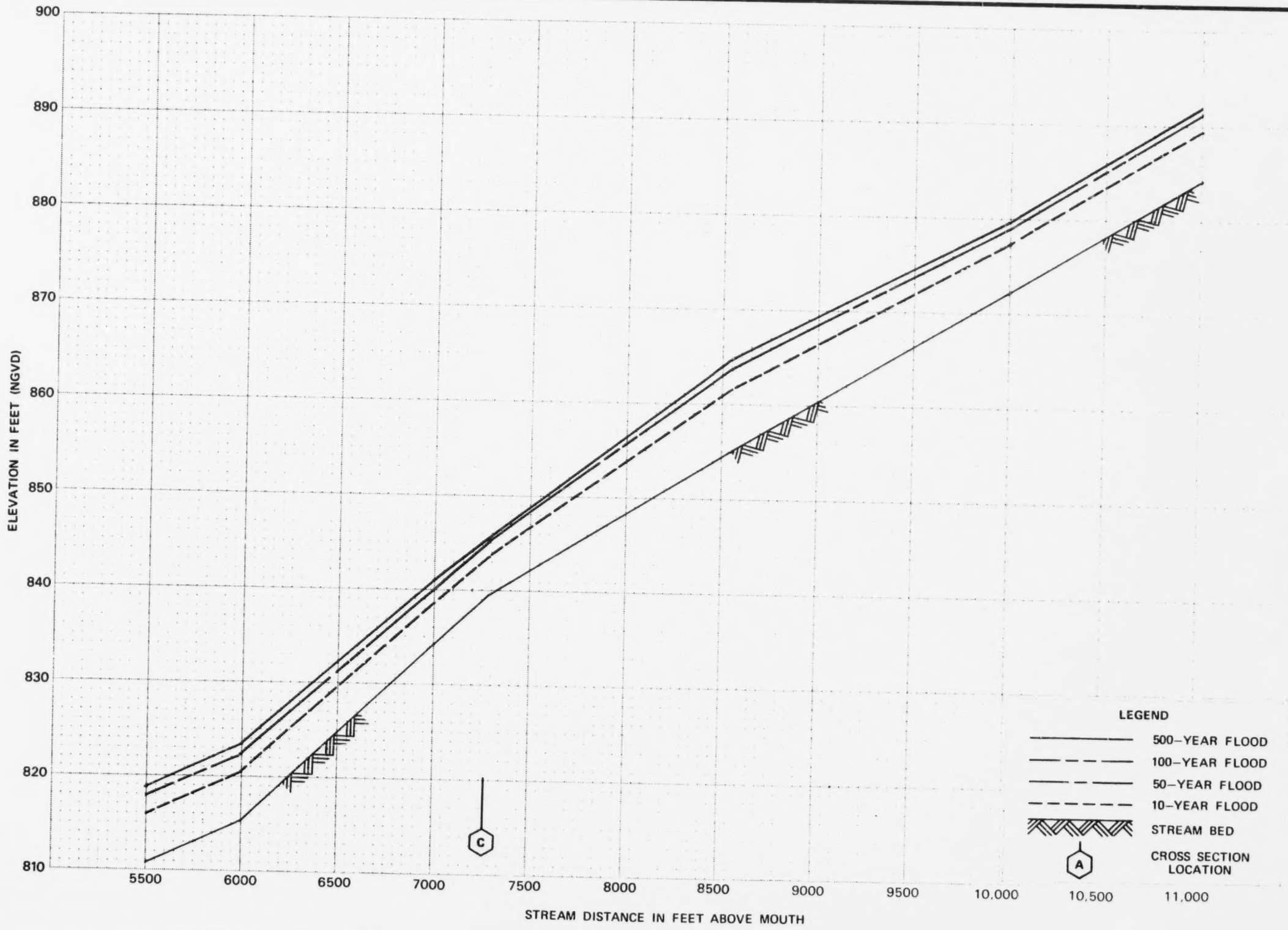
03P

FEDERAL EMERGENCY MANAGEMENT AGENCY

RUSSELL COUNTY, KY
(UNINCORPORATED AREAS)

FLOOD PROFILES

LITTLE LILY CREEK



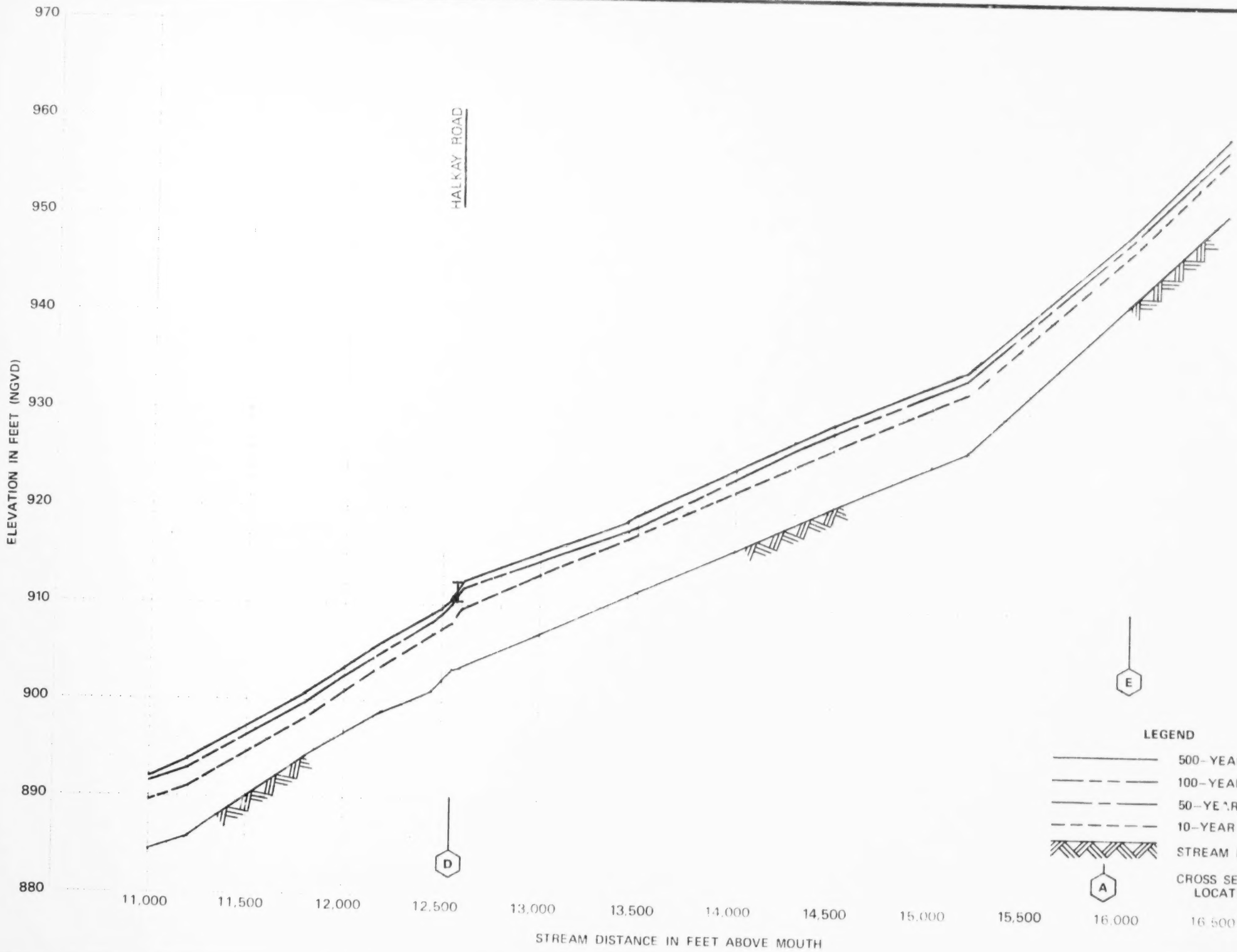
FLOOD PROFILES

LITTLE LILY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

RUSSELL COUNTY, KY
(UNINCORPORATED AREAS)

04P



FLOOD PROFILES

LITTLE LILY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

RUSSELL COUNTY, KY
(UNINCORPORATED AREAS)

05P

FLOOD PROFILES

LITTLE LILY CREEK

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